REMARKS/ARGUMENTS

Claims 18 and 23-52 are active. As discussed with Examiner Nguyen the term "monomers" has been removed, thus, reverting to the previously terminology "cinnamic acid". The Applicants continue to traverse the Examiner's interpretation of the term "cinnamic acid" as reading on both cinnamic acid *per se* as well as polymers made with cinnamic acid or containing "-cinnamyl-" moieties. So that there can be no confusion as to whether the cinnamic acid of the claims is cinnamic acid itself, or a polymer containing a -cinnamyl- moiety, the chemical structure of cinnamic acid has been placed in independent claims 18, 40 and 47. No new matter has been introduced, nor any new issues, since the claims as directed to "cinnamic acid" have already been examined.

The Applicants thank Examiner Nguyen for the kind and helpful interview of July 23, 2007. Definitions of the term "cinnamic acid" from the Merck Index and Wikipedia (attached) were provided and discussed. The Examiner maintained that the claims directed to "cinnamic acid" encompassed the prior art polymers which contain -cinnamyl- moieties, but agreed to consider written arguments on this issue. The Applicants pointed out that the specification exemplifies, and thus provides descriptive support for, the so-called cinnamic acid monomers. However, it was agreed that removal of this term from the claims would moot the new matter rejection.

Restriction/Election

The Applicants previously elected with traverse Group I, Claims 1-13, directed to a plant growth regulator. The claims of Groups II-IV which are respectively directed to a method of making (II) and method of use (III) for the plant growth regulator, as well as dwarfing plant (IV) have been withdrawn from consideration. Upon an indication of

allowability for a claim in the elected Group I, the Applicants respectfully request rejoinder and allowance of non-elected claims which depend from, or otherwise incorporate the limitations of, said allowed claim.

Rejection—35 U.S.C. §112, first paragraph

Claims 18, 23-40, 47, and 51-52 were rejected under 35 U.S.C. 112, first paragraph, as introducing new matter in the term "monomers". While the Applicants traverse this rejection, since the specification inherently supports the prior claim language, to simplify the claims and remove a potential issue for Appeal, this term has been removed from the claims. Accordingly, this rejection should now be withdrawn.

Rejection—35 U.S.C. §112, second paragraph

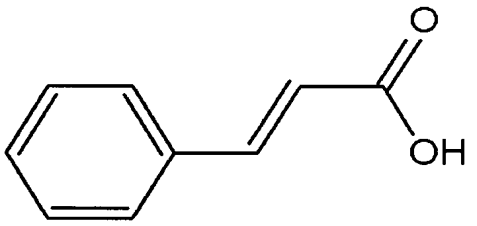
Claim 51 was rejected under 35 U.S.C. 112, second paragraph, as being indefinite. This issue is moot in view of the amendment above.

Rejection—35 U.S.C. §102

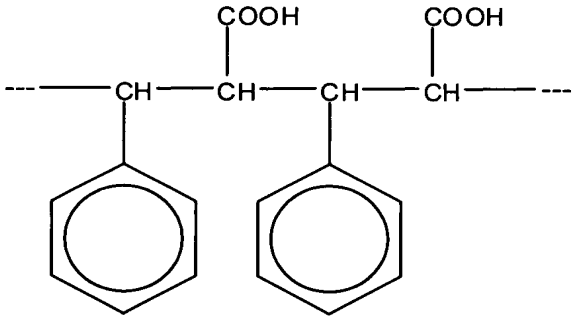
Claims 18, 23-26, 28 and 47 were rejected under 35 U.S.C. 102(b) as being anticipated by Ferguson et al., U.S. Patent No. 3,157,964. Ferguson is directed to compositions containing polymers made with cinnamic acid. These polymers, whether homopolymers or copolymers, do not anticipate the claims because they have different chemical structures. In Ferguson, col. 3, line 25, cinnamic acid is referred to as a representative example of the alpha, beta, and beta-ethylenically unsaturated carboxylic acid, which can be employed in the addition polymer described by Ferguson, col. 3, lines 27-28. As detailed below, whether or not cinnamic acid is used to make an addition polymer or an

addition copolymer, the resulting homopolymer or copolymer does not contain cinnamic acid.

The cinnamic acid of the present claims has the following formula:

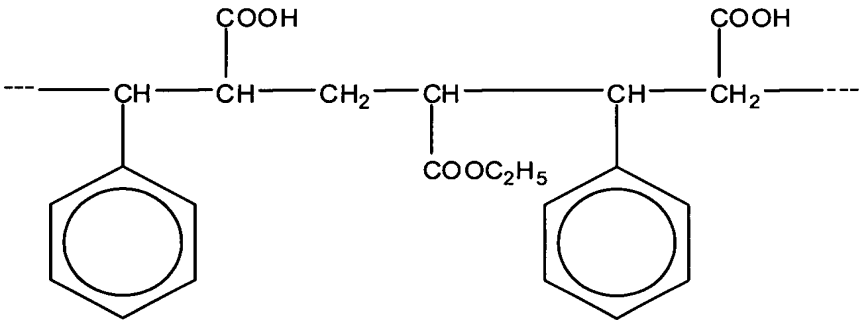


Homopolymerization. Cinnamic acid molecules can be bonded together in a homopolymerization reaction which converts their double bonds into covalent bonds forming a copolymer:



As immediately evident from comparison of the two structures above, cinnamic acid and a homopolymer made using cinnamic acid have materially different chemical structures.

Copolymerization with ethyl acrylate. Homopolymerization of cinnamic acid is difficult, therefore, it is preferred to copolymerize cinnamic acid with a highly-polymerizable molecule, such as ethyl acrylate. Copolymerization of cinnamic acid with ethyl acrylate produces a copolymer such as:



As readily appreciated by those of ordinary skill in the polymer arts and from the illustrations above, cinnamic acid and a copolymer made with cinnamic acid are distinct molecules having different chemical structures. The cinnamic acid used to make the homo- or copolymer no longer exists and has lost its chemical identity in the polymer. Therefore, the Applicants respectfully request that this rejection be withdrawn.

Rejection—35 U.S.C. §103

Claim 27 was rejected under 35 U.S.C. 103(a) as being unpatentable over Ferguson et al., U.S. Patent No. 3,157,964, in view of Pierzynski et al.

Ferguson has been addressed above and does not disclose cinnamic acid, but polymers made with cinnamic acid (i.e., where the cinnamic acid which has lost its identity in a larger polymeric structure). Ferguson does not disclose or suggest formulating compositions containing cinnamic acid for regulating plant growth nor provide a reasonable expectation of success for regulating plant growth using such compositions.

Pierzynski also does not disclose cinnamic acid. Since the cited prior art does not disclose, suggest or provide a reasonable expectation of success for the present invention, this rejection may now be withdrawn.

Rejection—35 U.S.C. §103

Claims 29-32 were rejected under 35 U.S.C. 103(a) as being unpatentable over Ferguson et al., U.S. Patent No. 3,157,964, in view of Obrero et al.

Ferguson describes polymers made with cinnamic acid, but does not disclose or suggest formulating a composition that inhibits plant growth with the cinnamic acid molecule *per se*. Therefore, it cannot teach all the elements of the invention as required by 35 U.S.C. 103.

Obrero was cited as disclosing nonionic surfactants, but like Ferguson, does not disclose cinnamic acid. Therefore, the cited prior art in combination does not disclose the claimed invention.

Rejection—35 U.S.C. §103

Claims 33-40 were rejected under 35 U.S.C. 103(a) as being unpatentable over Ferguson et al., U.S. Patent No. 3,157,964.

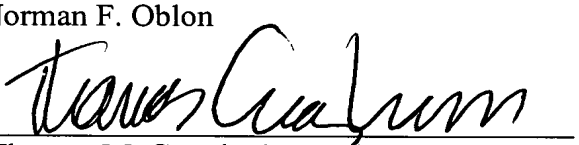
Ferguson describes polymers made with cinnamic acid, but does not disclose or suggest formulating a composition that inhibits plant growth with the cinnamic acid molecule *per se*. Therefore, it cannot teach all the elements of the invention as required by 35 U.S.C. 103. Moreover, lacking this disclosure, it cannot provide a reasonable expectation of success for the combination of cinnamic acid and any solubilizer. Accordingly, this rejection should now be withdrawn.

CONCLUSION

In view of the above amendments and remarks, the Applicants submit that this application is now in condition for allowance. Early notification to that effect is earnestly solicited.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.
Norman F. Oblon



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Cinnamic acid

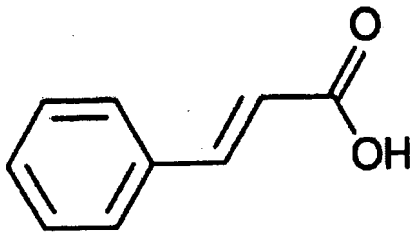
From Wikipedia, the free encyclopedia

Cinnamic acid has the formula $C_6H_5CHCHCOOH$ and is an odorless white crystalline acid, which is slightly soluble in water. It has a melting point of 133°C and a boiling point of 300°C.

It is obtained from oil of cinnamon, or from balsams such as storax. It is also found in shea butter and is the best indication of its environmental history and post-extraction conditions. It can also be made synthetically.

Cinnamic acid is used in flavours, synthetic indigo, and certain pharmaceuticals, though its primary use is in the manufacturing of the methyl, ethyl, and benzyl esters for the perfume industry. Cinnamic acid has a "honey, floral odor" (Merck Index); it and its more volatile ethyl ester (ethyl cinnamate) are flavour components in the essential oil of cinnamon, in which related cinnamaldehyde is the major constituent. Cinnamic acid is also part of the biosynthetic shikimate and phenylpropanoid pathways. Its biosynthesis is performed by action of the enzyme phenylalanine ammonia lysase (PAL) on phenylalanine.

Cinnamic acid is soluble in diethyl ether, insoluble in hexane.

Cinnamic acid	
	
General	
Systematic name	(E)-3-phenyl-2-propenoic acid
Other names	Cinnamic Acid, *trans*-Cinnamic Acid
Molecular formula	$C_6H_5CHCHCOOH$
Molar mass	148.17 g/mol
Appearance	monoclinic crystals
CAS number	[140-10-3]
Properties	
Solubility in water	0.4 g/L
Solubility in	Ethanol, Acetone, THF
Density	1.2475 g/cm^3
Melting point	133 °C
Boiling point	300 °C
Hazards	
MSDS	
EU classification	Irritant (Xi)
R-phrases	R36
S-phrases	S25
Flash point	>110 °C
LD_{50} oral, rat	2500 mg/kg
LD_{50} dermal, rabbit	>5000 mg/kg
Except where noted otherwise, data are given for materials in their standard state (at 25 °C, 100 kPa) Infobox disclaimer and references	

References

- Flavornet.org (http://www.flavornet.org/info/140-10-3.html)
- CRC Handbook
- Chemfinder (http://www.chemfinder.com/)
- Katzer, G. Gernot Katzer's Spice Pages (http://www.uni-graz.at/~katzer/engl/index.html), accessed August 17, 2006.
- Budavari, Susan (Ed.) *The Merck Index*, 13 Ed. Merck & Co., Inc, Whitehouse Station, NJ, USA, 2001.

Categories: Carboxylic acids | Aromatic compounds | Phenylpropanoids | Aromatic compound stubs

THE MERCK INDEX

AN ENCYCLOPEDIA OF
CHEMICALS, DRUGS, AND BIOLOGICALS

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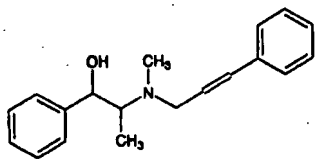
in about 7 vols of 60% alc. Misc with alcohol, ether, chloroform, oils. LD_{50} in rats (mg/kg): 2220 orally (Jenner).

USE: In the flavor and perfume industry.

2357. Cinnamedrine. *α-[1-[Methyl(3-phenyl-2-propenyl)amino]ethyl]benzenemethanol; N-cinnamylephedrine; α-[1-(N-cinnamyl-N-methylamino)ethyl]benzyl alcohol.* $C_{19}H_{23}NO$; mol wt 281.40. C 81.10%, H 8.24%, N 4.98%, O 5.69%. Smooth muscle relaxant. Prepn: Stolz, Flaecher, U.S. pat. 1,959,392 (1934 to Winthrop Chem.); Welsh, Keenan, *J. Am. Pharm. Assoc., Sci. Ed.* 30, 123 (1941).



dl-Hydrochloride, $C_{19}H_{23}NO.HCl$, bitter crystals from ethyl acetate + chloroform, mp 180-185° (base, mp 72-78°). Sol in about 80 parts water and 10 parts alc at 20°, more easily sol at higher temps; sol in 50 parts chloroform; sparingly sol in ether, benzene.

THERAP CAT: Antispasmodic.

2358. Cinnamic Acid. *3-Phenyl-2-propenoic acid; β-phenylacrylic acid.* $C_9H_8O_2$; mol wt 148.16. C 72.96%, H 5.44%, O 21.60%. $C_6H_5CH{=}CHCOOH$. The ordinary synthetic cinnamic acid which is described here is the *trans*-isomer. Occurs free and partly esterified in storax, balsam Peru or Tolu, oil of cinnamon, coca leaves. Isoln: Beilstein, Kuhlberg, *Ann.* 163, 123 (1872); von Miller, *Ann.* 188, 196 (1877). Synthesis (Perkin reaction) from benzaldehyde, acetic anhydride, and potassium acetate: *Org. Reactions* 1, 248 (1942); from oxalyl bromide + styrene: Treibs *et al., Naturwiss.* 45, 85 (1958); from acetylene + benzaldehyde: Herbetz, *Ber.* 92, 541 (1959). Prepn of *cis*- and *trans*-isomers: Comte *et al., Compt. Rend.* 245, 1144 (1957). Isoln from wood-rotting fungus, *Stereum subpileatum* Berk. & Curt.: Birkinshaw *et al., Biochem. J.* 66, 188 (1957).

Monoclinic crystals, d_4^1 1.2475. mp 133°; bp 300°. Distilling at 146° causes decarboxylation to styrene. K at 25° = 3.5×10^{-5}. uv max (alc): 273 nm. One gram dissolves in about 2000 ml water at 25° (more sol in hot water), in 6 ml alc, 5 ml methanol, 12 ml chloroform. Freely sol in benzene, ether, acetone, glacial acetic acid, carbon disulfide, oils. The alkali salts are sol in water.

Methyl ester, $C_{10}H_{10}O_2$, crystals, odor fruity and balsamic, reminiscent of strawberries. mp 36°. d_0^{36} 1.042. bp 261.9°; bp_{15} 132.5-134°. n_D^{32} 1.5766. Freely sol in alcohol, ether. Practically insol in water. Clearly sol in 80% alc.

Ethyl ester, $C_{11}H_{12}O_2$, *ethyl cinnamate, ethyl phenylacrylate.* Almost colorless, oily liquid, fruity and balsamic odor, reminiscent of cinnamon with an amber note. d_{15}^{25} 1.045-1.048. d_4^{20} 1.049. bp 271°. mp 6-10°. n_D^{20} 1.559-1.561. Miscible with alcohol, ether. Insol in water. Soluble in 3 vols of 70% alc.

n-Butyl ester, $C_{13}H_{16}O_2$, *butyl cinnamate, Eliminoxy.* Liquid, agreeable ethereal odor when pure. bp_{13} 145°. d_4^{15} 1.012. Very sparingly sol in water (<0.5%). Sol in 95% alc, ether, acetone, chloroform, benzene. Incompatible with alkalies; stable to light, air, and storage temps.

Anhydride, $C_{18}H_{14}O_3$, *cinnamic anhydride.* Crystals, mp 136°. Practically insol in water. Freely sol in warm benzene; slightly sol in alc.

USE: The main use of cinnamic acid is in the manuf of the methyl, ethyl, and benzyl esters for the perfume industry. Ethyl ester used in glass prisms, lenses. Some esters, such as chaulmoogryl and other derivatives, are used in medicine.

2359. Cinnamon. Dried bark of cultivated trees of *Cinnamomum* sp, *Lauraceae. Constit.* Cinnamaldehyde, tannins, 1-4% volatile oil, sugar. *Review:* A. Y. Leung, *Encyclopedia of Common Natural Ingredients* (John Wiley & Sons, New York, 1980) pp 123-126.

Ceylon cinnamon, true cinnamon. Isolated from *C. zeylanicum* Nees. *Habit.* Ceylon, Sumatra, Borneo; cultivated in tropical Africa, America and Asia.

Saigon cinnamon. Isolated from *C. loureirii* Nees. *Habit.* China; cultivated in Java, Sumatra, S. America.

USE: Pharmaceutic aid (flavor).

THERAP CAT: Carminative.

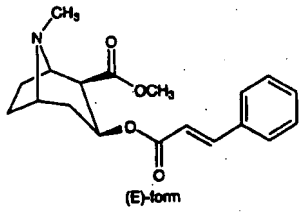
THERAP CAT (VET): Has been used as a carminative and antidiarrheal.

2360. Cinnamoyl Chloride. *3-Phenyl-2-propenoyl chloride.* C_9H_7ClO; mol wt 166.61. C 64.88%, H 4.23%, Cl 21.28%, O 9.60%. $C_6H_5CH{=}CHCOCl$. Prepn by the action of oxalyl chloride on sodium cinnamate: Adams, Ulich, *J. Am. Chem. Soc.* 42, 605 (1920).

Yellowish crystals. mp 35-36°; bp_{58} 170-171°; bp_{25} 154°; bp_{16} 147°; bp_2 101°; $d_4^{35.3}$ 1.1617; $n_D^{35.5}$ 1.614.

USE: Titrimetric determination of small amts of water.

2361. Cinnamoylcocaine. *[1R-(exo,exo)]-8-Methyl-3-[(1-oxo-3-phenyl-2-propenyl)oxy]-8-azabicyclo[3.2.1]octane-2-carboxylic acid methyl ester; ecgonine cinnamate methyl ester;* cinnamoylecgonine methyl ester; cinnamylcocaine; cinnamoylmethylecgonine. $C_{19}H_{23}NO_4$; mol wt 329.40. C 69.28%, H 7.04%, N 4.25%, O 19.43%. From leaves of *Erythroxylon coca* Lam., *Erythroxylaceae*, particularly from the Javanese leaves: Liebermann, *Ber.* 22, 2661 (1889); de Jong, *Rec. Trav. Chim.* 67, 484 (1948); Hegnauer, Fikenscher, *Pharm. Acta Helv.* 35, 43 (1960); from *E. monogynum* Roxb.: Chopra, Gosh, *Arch. Pharm.* 276, 340 (1938).



(E)-form

Needles, mp 121°. $[\alpha]_D$ −4.7° (chloroform). Almost insol in water; sol in alcohol, chloroform, ether.

2362. Cinnamyl Alcohol. *3-Phenyl-2-propen-1-ol;* cinnamic alcohol; styryl carbinol; γ-phenylallyl alcohol. $C_9H_{10}O$; mol wt 134.18. C 80.56%, H 7.51%, O 11.92%. $C_6H_5CH{=}CHCH_2OH$. Occurs (in the esterified form) in storax and in balsam Peru, cinnamon leaves, hyacinth oil. Obtained by the alkaline hydrolysis of storax. Prepd synthetically by reducing cinnamal diacetate with iron filings and acetic acid; from cinnamaldehyde by Meerwein-Ponndorf reduction with aluminum isopropoxide: Meerwein, Schmidt, *Ann.* 444, 221 (1925).

Needles or cryst mass. Odor of hyacinth. mp 33°. d_{15}^{35} 1.0397. $bp_{1.0}$ 72.6°; bp_5 102.5°; bp_{10} 117.8°; bp_{20} 133.7°; bp_{40} 151.0°; bp_{60} 162.0°; bp_{100} 177.8°; bp_{200} 199.8°; bp_{400} 224.6°; bp_{760} 250.0°. n_D^{20} 1.58190; n_D^{33} 1.57580. When small amounts of impurities are present as in the natural article (cinnamyl alcohol from storax), it remains fluid at lower temps than the melting point. Minimum congealing points specified by the Essential Oil Assn are: 33.0° for cinnamic alcohol pure; 28.0° for cinnamic alcohol prime; 20.0° for cinnamic alcohol from storax. Is oxidized slowly on exposure to heat, light and air. Sol in water, glycerol. Clearly sol in 3 vols 50% alc. Freely sol in alc, ether, other common organic solvents.

USE: In perfumery; as deodorant in 12.5% soln in glycerol.

2363. Cinnamyl Anthranilate. *2-Aminobenzoic acid 3-phenyl-2-propenyl ester; anthranilic acid cinnamyl ester;* 3-phenyl-2-propenyl anthranilate; cinnamyl *o*-aminobenzoate. $C_{16}H_{15}NO_2$; mol wt 253.30. C 75.87%, H 5.97%, N 5.53%, O 12.63%. Synthetic imitation grape or cherry flavoring agent. Prepn: A. Seldner, *Am. Perfumer Essent. Oil Rev.* 54, 295 (1949); R. P. Staiger, E. B. Miller, *J. Org. Chem.* 24, 1214 (1959). Carcinogenicity studies: G. D. Stoner *et al., Cancer Res.* 33, 3069 (1973); *Fed. Reg.* 45, 85832 (1980). *Review:* D. L. Opdyke, *Food Cosmet. Toxicol.* 13, Suppl., 751-752 (1975).